



JOURNAL OF THE LEPIDOPTERISTS' SOCIETY

Volume 63

2009

Number 1

Journal of the Lepidopterists' Society
63(1), 2009, 1–10

A NEW SPECIES OF *DRASTERIA* HÜBNER (NOCTUIDAE: CATOCALINAE: MELIPOTINI) FROM ARIZONA, WITH COMMENTS ON THE GENUS

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ABSTRACT. *Drasteria walshi* n. sp. (Noctuidae: Catocalinae) from southeastern Arizona is described and illustrated. The new species belongs to the *D. fumosa*-*D. divergens* species group. *Drasteria walshi* is distinguished from related species of *Drasteria* by wing color and pattern, and structure of male and female genitalia. Taxonomic problems in *Drasteria* are discussed.

Additional key words: taxonomy, *Drasteria*, new species, Arizona, Nearctic

The genus *Drasteria* Hübner, 1818, with more than 60 described species, is the largest genus in the tribe Melipotini (sensu Fibiger & Lafontaine 2005). It is exclusively Holarctic in distribution, with 27 species known from the Nearctic region and 35 species known from the Palearctic region. No species are known to occur in the tropics or Southern hemisphere. The only comprehensive study of the Palearctic species of the genus was published by John (1910) almost a hundred years ago. Since then, a dozen new species and subspecies of *Drasteria* have been described from the Palearctic region. The Palearctic species of *Drasteria* are in need of revision because the status of many taxa remains unresolved, and some widely distributed species may actually be complexes of closely related species, as is the case for *Drasteria rada* (Boisduval, 1848) (Metlevski *et al.*, unpublished data). Richards (1939) revised the Nearctic species of *Drasteria*, and few changes have occurred in the taxonomy of Nearctic species since then. Some taxonomic problems pointed out by Richards, such as the relationship between *D. tejonica* (Behr, 1870) and *D. howlandii* (Grote, 1864), or the status of *D. nichollae* (Hampson, 1926), have not been resolved yet. Richards' 1939 revision downgraded to subspecies (race by Richards) a number of taxa

originally described as separate species by other workers. Poole's 1989 catalog of the world Noctuidae (Poole 1989) did not recognize any taxa at the subspecies level and synonymized all the names applicable to the taxa treated as subspecies by Richards. As a result, all *Drasteria* names synonymized by Poole have been excluded from the lists of Nearctic fauna, such as Nomina Insecta Nearctica (Poole & Gentili 1996). Nevertheless, the status of many taxa treated by Richards as subspecies of other *Drasteria* species remains unclear. *Drasteria hastingsii* (H. Edwards, 1878) is now recognized as a valid species, and Wagner *et al.* (in press) provide evidence that *Drasteria graphica atlantica* Barnes & McDunnough, 1918 represents a full species. It is likely that others, such as *D. sabulosa abrupta* (Barnes & McDunnough, 1918) or *D. adumbrata alleni* (Grote, 1877), are also valid species.

In addition, our current investigations suggest that some North American species of *Drasteria* are actually complexes of closely related species. For example, populations of *D. inepta* (Edwards, 1881) from Colorado and northern New Mexico are not conspecific with populations from southeastern Arizona and southwestern New Mexico. Finally, discoveries of new

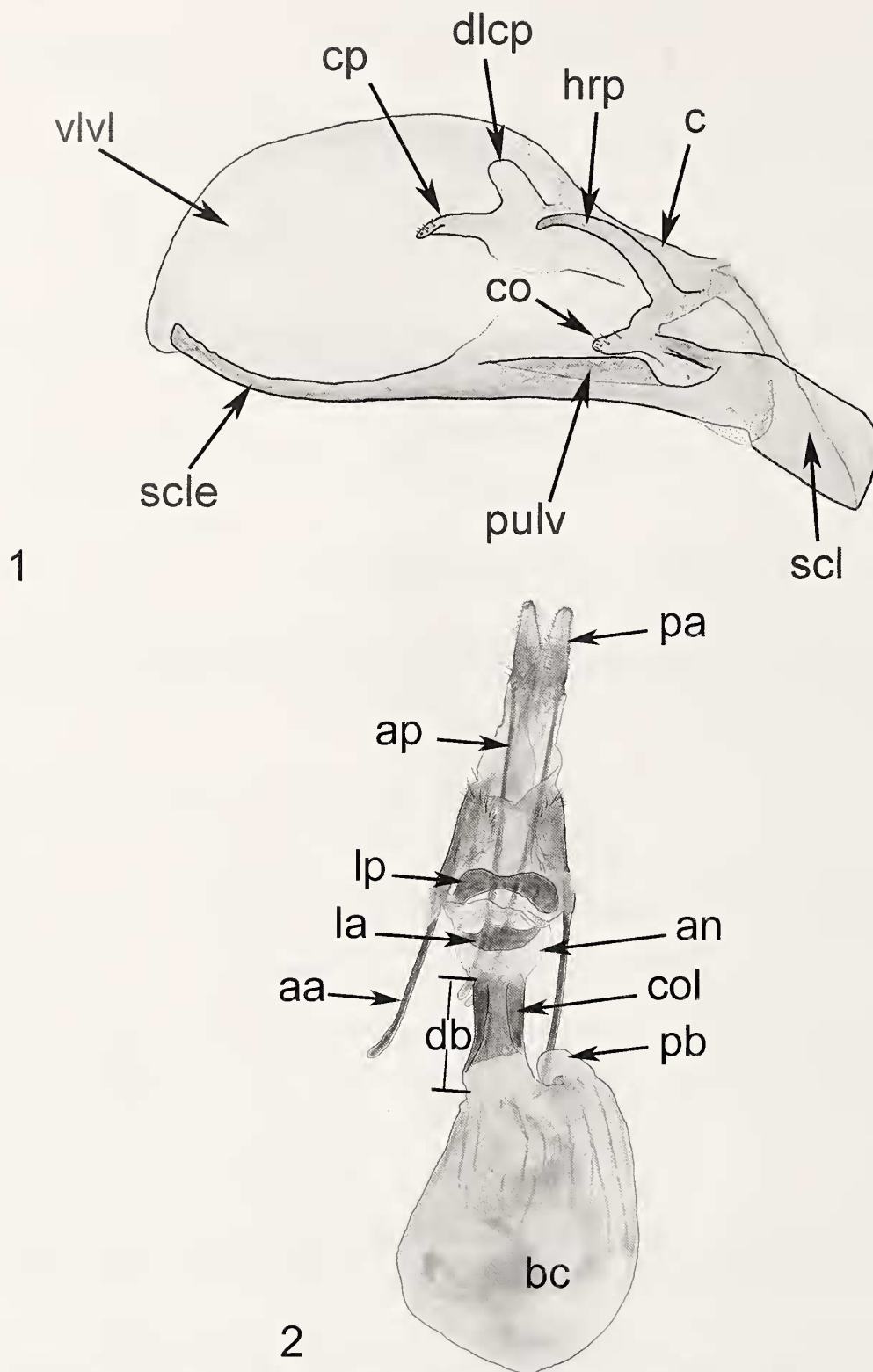


FIG. 1. Medial surface of *Drasteria* male valve (based on a left valve of *D. pallens* (Grote & Robinson, 1866)) (c – costa; co – conus; cp – costal process; dlcp – dorsal lobe of costal process; hrp – harpe; pulv – pulvinus; scl – sacculus; scle – saccular extension; vlvl – valvula).

FIG. 2. Female genitalia of *Drasteria* (based on *D. sinuosa* (Staudinger, 1884)) (aa – apophyses anteriores; an – antrum; ap – apophyses posteriores; bc – bursa copulatrix; col – colliculum; db – ductus bursae; la – lamella antevaginalis; lp – lamella postvaginalis; pa – papilla analis; pb – pseudobursa).

species of *Drasteria* in North America are still occurring. *Drasteria convergens* Mustelin, 2006, was described recently from California, and below we describe a new species from southeastern Arizona.

The terminology used here for structures of the male valva follows the scheme shown in Fig. 1. We use the term “harpe” in a broad sense since the problem of homologies of valval structures, to which this term is applicable in various groups of Noctuidae, remains unresolved. For this reason we follow with some modifications the broad definition of the term “harpe” given by Kuznetsov & Stekolnikov (2001), and define the harpe as various and not necessarily homologous sclerotized structures on the inner surface of valva, that are not derived from the costa or sacculus. Here we use the term “harpe” for the long and slender process (processus basalis valvae in John 1910) arising from a sclerotised, angled ridge on the inner surface of proximal part of the valva. We also use the term “conus” for the small process located just below the harpe, and

the term “pulvinus” for the shelllike process arising laterad from the inner side of the basal part of the saccular extension. The last two terms were introduced by John (1910) for *Drasteria* but have not been used since. Terminology for male genitalia other than valva follows Goater *et al.* (2003).

Species of *Drasteria* have aedeagi with a very complex vesica, consisting of a number of diverticula of different sizes. The complexity of the vesica of species of *Drasteria* was shown only recently (Goater *et al.* 2003; Mustelin 2006); previous taxonomic works on the genus have not made mention of the vesica. Our current investigations show the number and relative position of diverticula are good characters for grouping members of the genus into species groups. Thus, we include a detailed description of the vesica in the species description.

Terminology for female genitalia follows Kühne (2005) and is shown in Fig. 2. Terminology for wing patterns is shown in Fig. 3.

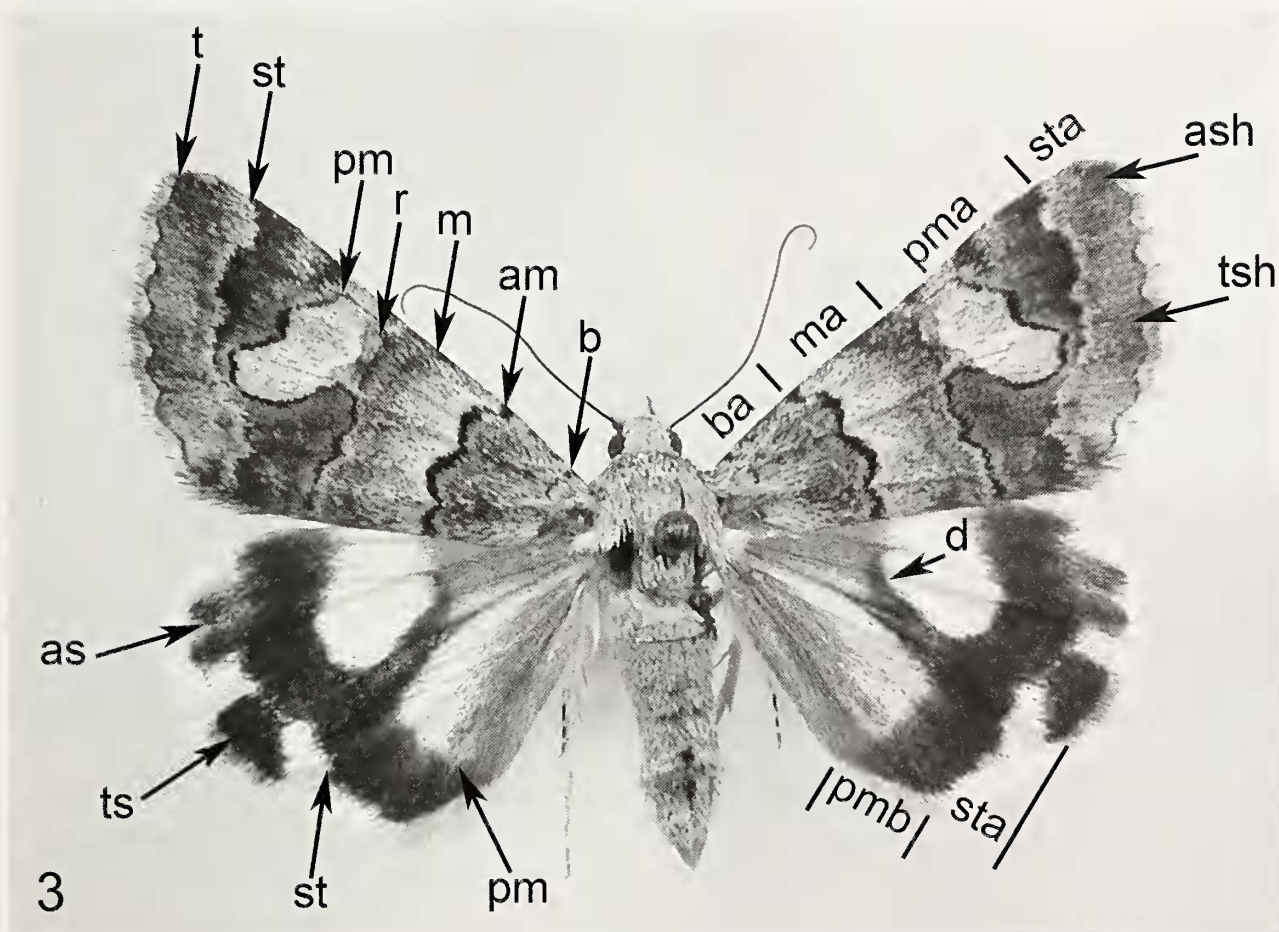
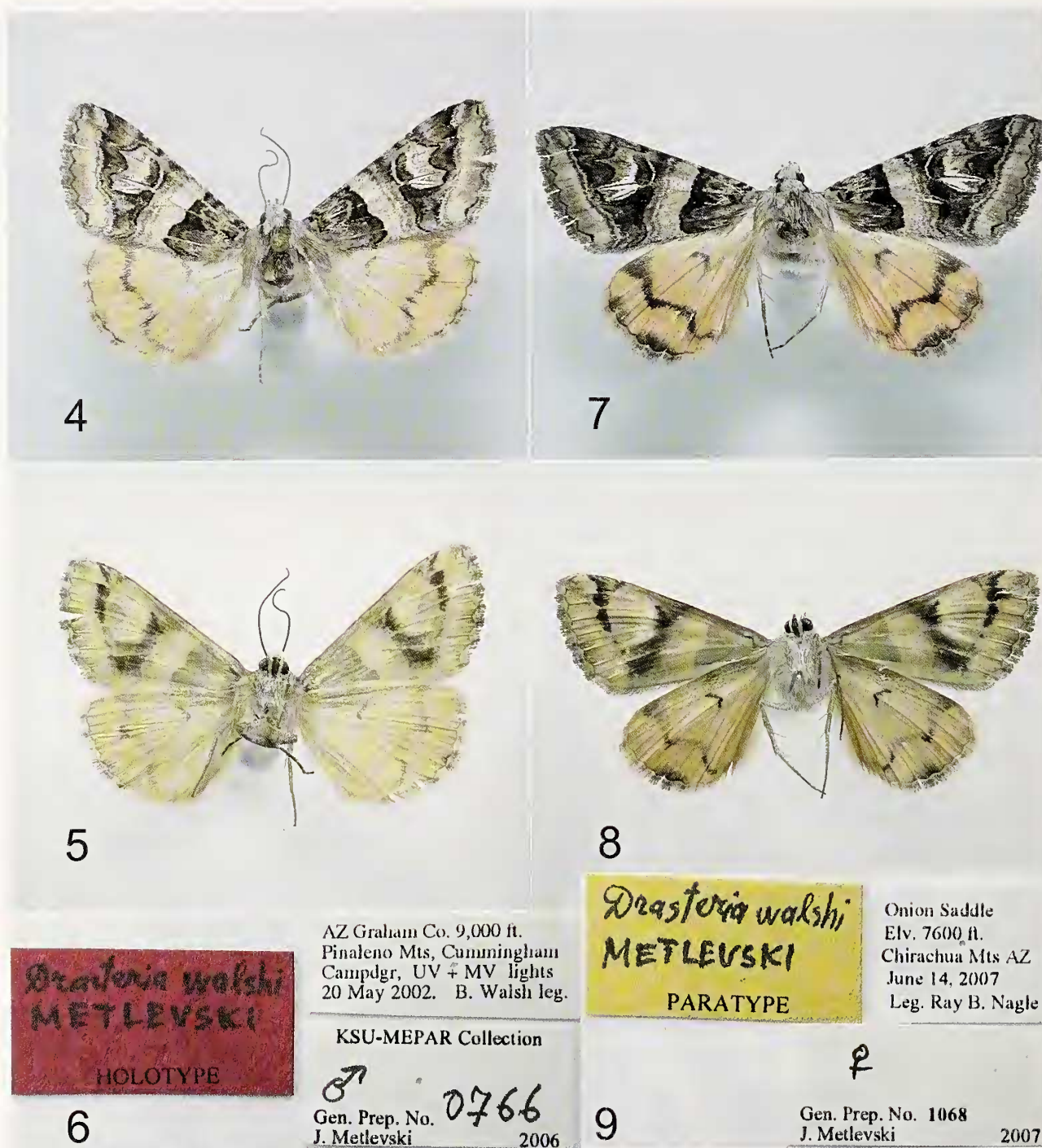
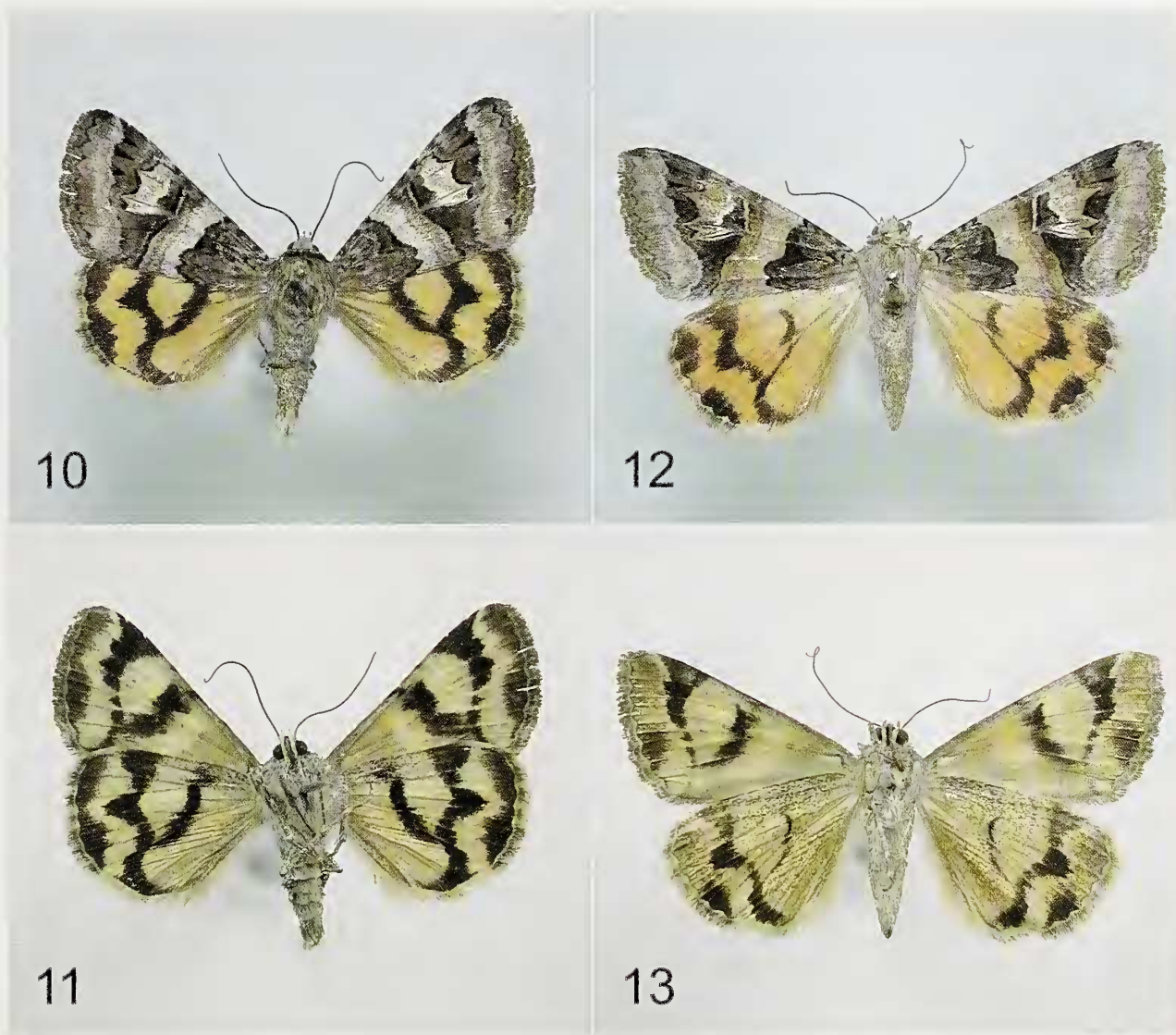


FIG. 3. Wing pattern of *Drasteria*, dorsal surface (based on *D. christophi* (Alpheraky, 1895)) (am – antemedial line; as – apical spot; ash – apical shadow; b – basal line; ba – basal area; d – discal spot; m – medial shadow; ma – medial area; pm – postmedial line; pma – postmedial area; pmb – postmedial band; r – reniform spot; st – subterminal line; sta – subterminal area; t – terminal line; ts – terminal spot; tsh – terminal shadow).



FIGS. 4-9. *Drasteria walshi*. 4-6, holotype. 4, dorsal surface. 5, ventral surface. 6, pin labels. 7-9, female paratype, Chiricahua Mts. 7, dorsal surface. 8, ventral surface. 9, pin labels.



Figs. 10-13. *D. divergens*. 10-11, male, White Pine Co., Nevada. 10, dorsal surface. 11, ventral surface. 12-13, f. socia, female, Santa Barbara, California. 12, dorsal surface. 13, ventral surface.

Abbreviations for institutions and collections used in the text are as follows: KSU-MEPAR = Kansas State University Museum of Entomological Prairie Arthropod Research; BW = Bruce Walsh collection (Tucson, AZ); RN = Ray B. Nagle (Tucson, AZ) collection.

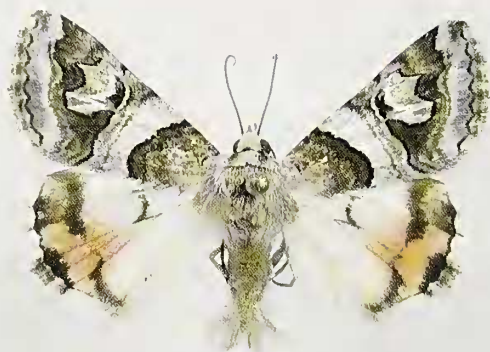
***Drasteria walshi* Metlevski, new species**

(Figs. 4-9, 18-20)

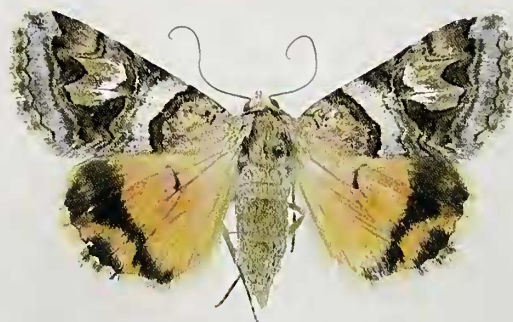
Diagnosis. *Drasteria walshi* is most similar to *D. divergens* (Figs. 10-13, 21, 23), especially to the form with orange hind wings, *D. divergens* f. *socia* (Behr, 1870) (Figs. 12, 13). The following features can be used to differentiate *D. walshi* from *D. divergens*: in *D. walshi* the underside of the wings is pinkish, while they are yellow to pale yellow in *D. divergens*; in *D. walshi*

the terminal spots on the underside of the wings are obscured or completely absent, while in *D. divergens* there are strong black terminal spots on the underside of the wings; in *D. walshi* the discal spot is a thin dark comma-like line not connected to the postmedial band, compared to a strong black discal spot connected to the postmedial band (at least vein CuA2 is black from the postmedial band to the discal spot, but usually the connection is much stronger) in *D. divergens*.

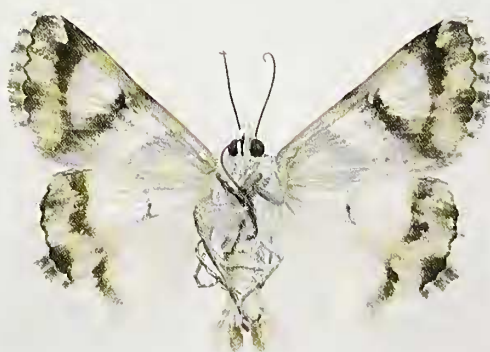
Among other species of *Drasteria* occurring in southeastern Arizona only one, *D. tejonica* (Behr, 1870), has forewings with similar pattern and colored hind wings. *Drasteria tejonica* however is noticeably smaller in size and has much stronger black pattern on the hind wings (Figs. 14-17). Males of *D. tejonica* (Figs. 14-15)



14



16



15



17

Figs. 14-17. *Drasteria tejonica*, Pima Co., Arizona. 14-15, male. 14, dorsal surface. 15, ventral surface. 16-17, female. 16, dorsal surface. 17, ventral surface.

can be easily separated from *D. walshi* by the coloration of the hind wings, which are white basally in *D. tejonica*.

In males, the costal processes of the valvae of *D. walshi* are robust, elongate, sinuous and pointed at the tip (Fig. 18). This readily distinguishes *D. walshi* from *D. divergens* (Fig. 23), as well as from any other species in the genus. Female genitalia of the new species (Fig. 20) could be confused only with those of *D. divergens* (Fig. 21) and *D. fumosa* (Fig. 22). The antevaginal plate in *D. walshi* is more than 3 times longer than the colliculum, while just slightly longer in *D. divergens* and about 2 times longer in *D. fumosa*. The antevaginal plate of *D. walshi* is semi-rectangular in shape, compared to triangular with a blunt tip in *D. fumosa*. The shape of the antevaginal plate of *D. walshi* is similar

to that of *D. divergens*: both species have a rectangular anterior portion and a slightly narrower posterior portion. However, in *D. walshi* the broader anterior portion is about half the length of the narrower posterior portion, while in *D. divergens* the length of both parts is subequal.

Description. *Head:* Light brownish gray; labial palpus light grey, with some dark brownish gray scales on the external side of first and second segments; antenna filiform in both sexes.

Thorax: Covered with long flattened and slightly spatulate hairs dorsally, with long simple hairs ventrally; patagia light brownish gray, with a dark brown longitudinal stripe; remainder of thorax little darker and with light pinkish tint; tegulae slightly rimmed with dark brown hairs on external margin; legs same color as thorax except for tarsi, which are darker brownish gray with a ring of light gray scales at distal end of each segment.

Forewing: Length 19-23 mm; males and females similar; ground color light brownish gray with light pinkish tint; basal line double, black, enclosed area light brownish gray; basal area brownish gray in anterior half, dark gray in posterior; antemedial line double, internal

and external lines black, enclosed area filled with dark brown, internal line making a strong long tooth toward base of wing between veins A and Cu and two small teeth at veins A and Sc, entire antemedial line almost straight from costa to vein A, abruptly curving inward after vein A; medial area very light brownish gray, somewhat darker in outer part and at costa; medial line brown, not strongly contrasting, double, the internal line thin, external one wider; both lines strongly expanded and becoming dark brown or almost black at costa; reniform spot dark brown, black rimmed, with strong whitish outline on outer margin and thin whitish outline followed by thin black line on inner margin; postmedial line double, area enclosed between internal and external lines dark brown except at costa where pinkish, internal line strong and black through its entire length, external one weaker, marked with dark brown or black scales, almost disappearing in the middle; postmedial line turning abruptly toward the apex at vein R_1 and almost parallel to costal margin until vein R_2 , then bending again and curving outward, includes strong tooth pointed outward at vein M_1 and another smaller tooth at vein M_3 , curving inward in between; making an abrupt turn at vein CuA_1 , continuing along this vein toward base of reniform spot then turning toward posterior margin of wing, curving slightly outward between base of reniform and vein A, turning toward anal angle of wing at vein A; area between reniform spot and postmedial line brownish grey to brown, filled with brown and light brownish grey scales, veins M_1 and CuA_1 within this area dark brown with strong whitish outlines joined with similar outline on inner margin of reniform spot; postmedial area dark gray, pinkish along postmedial line at costa; subterminal line slightly incurved between costa and vein R_1 , then slightly waving and subparallel to inner margin of wing, at vein A, turning toward anal angle of wing, dark brown at veins, otherwise black in anterior half of wing, mostly brown, with some black scales between veins in posterior half; 4 strong black arrow marks arising from subterminal line between veins in anterior half of wing, and pointing toward base of wing; subterminal line with a thin pale brownish gray outline along outer side, immediately followed by dark brown line; subterminal area light brownish gray, somewhat darker in place where terminal shadow is located; apical shadow obvious, as a dark brown path, connected to dark brown outer outline of subterminal line; terminal line fine, wavy, obvious, dark brown to almost black; fringe pinkish at base, otherwise grayish brown, checkered. Underside pale pinkish to pinkish; reniform spot dark brown to black; dark brown transversal shadow extending from the middle of costa through inner edge of reniform toward the anal angle, ending well before anal angle between veins CuA_2 and A; subterminal line greasy pinkish with dark edges at costa, otherwise dark brown to black, convex, wide at costa, rapidly narrowing toward posterior edge of wing becoming a thin line at its posterior end, meeting transversal shadow at vein CuA_2 and not extending after this point, outer edge of subterminal line wavy, inner edge evenly convex; terminal and apical shadows brownish, obscured and sometimes barely visible; terminal line thin, dark brown, wavy, vanishing at anal angle; fringe pinkish at base, otherwise grayish brown, lighter toward anal angle.

Hind wing: Ground color orange pink, a few dark brown scales at anal margin and occasionally a few brownish scales near base of wing and on Cu stem; discal spot a narrow dark grayish brown line along cross-vein, not connected to postmedial band; postmedial band dark grayish brown to black, narrow through most of its length but strongly widened between vein R_1 and costa, subparallel to outer margin between anal angle and vein CuA_2 , approaching vein CuA_2 curving abruptly mesad, and at vein CuA_2 angling toward apex, then turning toward costa between veins M_2 and M_3 ; outer margin of postmedial band turning sharply outward at vein R_1 ; terminal and apical spots narrow patches, dark grayish brown to black, with obscure inner edge, almost disappearing in some specimens; terminal line obvious through most of its length, vanishing near anal angle, dark grayish brown to black, thin, wavy; basal portion of fringe pink, outer portion pink orange, greasy orange brown at terminal spot, with some blackish scales between basal and outer layers at terminal and apical spots. Underside pale pinkish to pinkish, some brown or brownish scales along costal margin; discal spot similar to that on upper side but weaker; postmedial band intermittent, marked by few brown scales at costal margin, remaining remnants present only between veins M_1 and M_2 , and between vein CuA_2 and anal angle; terminal spot a dark brown to blackish shadow, weak, in some specimens almost disappearing; apical spot absent; terminal line weaker than on upper side, otherwise similar; fringe same as upper side.

Abdomen: Ochreous gray, with some scattered dark brown scales.

Male genital capsule (Fig. 18): Uncus strong, curved, pointed at tip, dorsally with a low longitudinal crest and dense hairlike setae in third distal quarter; scaphium long, narrow, articulated at base of uncus;

valvae obovate, slightly asymmetrical, left valve slightly smaller, narrower in the middle and with more sinuous dorsal margin; valvula rounded, acute at ventro-distal angle, with a small tuft of setae on inner surface at ventro-distal end; area occupied by coremata small, subbasally on outer side of valva, extending along sclerotized base of valva from ventral edge of base of costa to ventral side of distal half of sacculus; sacculus about 4 times as long as wide, its dorsal edge slightly concave; saccular extension strong, slightly curved, ending just before tip of valvula in a small free prong-like projection turned inward toward genital capsule; pulvinus strong, broad, broader on left valva, tip of pulvinus with robust elongate setae; harpe curved, slender, smoothly narrowing to tip, apex flattened and rounded; conus present on both valvae, left one tapered, about 2 times as long as wide, right one minute, short; tip of conus bearing few microscopic setae; costa moderately sclerotized, with costal process present on both valvae; costal process prominent, broad based, strongly elongated, sinuous, tapered, pointed at tip; costal process on left valva shorter, directed along longitudinal axis of valva; costal process on right valva longer, directed slightly dorsad, reaching dorsal margin of valvula; saccus short, V-shaped; juxta symmetrical, about 2 times as long as wide, with deep V-shaped incision on dorsal margin and two short, curved, and divergent ventroanterior arms.

Aedeagus (Fig. 19): strong, straight, tubular, membranous in distal half dorsally but with a small sclerotized area at base of vesica, otherwise well sclerotized, its membranous portion finely spiculate; coecum short, slightly flattened dorsoventrally at tip; ventral plate of carina strongly sclerotized, long, narrow, slightly expanded at top, basal half of right margin with a strong longitudinal fold; dorsal plate of carina absent; inflated vesica short, turned dorsad, with a complex system of diverticula (insertion on Fig. 19): *diverticula arising on ventral side right of carinal plate* (2 large and 4–5 very small): **1.** diverticulus next to the tip of carinal plate, broad, about twice as long as wide, distally rounded, spiculate on right side, directed caudad, tip slightly turned left; **2.** group of 4–5 aligned small spiculate diverticula, next right to diverticulus 1, followed by diverticulus 3; **3.** the biggest diverticulus, two times longer than next longest diverticulus, slightly narrowing to the tip, finely spiculate, directed right laterodorsad, perpendicular to longitudinal axis of aedeagus; *diverticula arising on ventral side left of carinal plate* (1 bigger and 1 very small): **4.** diverticulus next to tip of carinal plate, short, bifurcated at tip, spiculate, directed left laterad, perpendicular to longitudinal axis of aedeagus, one of tips turned cephalad; **5.** very small, lobelike, with no spicula, between diverticulus 4 and tip of aedeagus; *diverticula arising at left dorsolateral angle of vesica* (2 bigger and 1 very small): **6.** globular, expanded distally, as long as wide, finely spiculate, directed dorsocaudad, with a narrow fingerlike projection arising left ventrolaterally and directed ventrad; **7.** second longest, tapering, finely spiculate, curved, directed cephalad, tip curving right dorsocephalad; **8.** very small, short, narrowing at tip, with no spicula, between diverticulus 7 and base of vesica; *top of vesica* exposed dorsad, bearing 1 small diverticulus and 1 small lobe; **9.** minute diverticulus, with no spicula, arising on right side close to diverticulus 2; **10.** small lobe with no spicula, close to the base of diverticulus 6; *posterior side of vesica*: **11.** bearing a small lobe with no spicula between diverticulus 1 and top of vesica.

Female genitalia (Fig. 20): Ovipositor telescopic; papillae analis with moderately sclerotized longitudinal band dorsally, weakly sclerotized in other parts, narrow, about 5 times as long as wide, strongly narrowing in distal third, tips rounded, membranous; surface of papillae with short scattered setae, which are denser on tips, some long setae at the base and tips of papillae analis; apophyses long and slender, posterior ones about 1.7 times longer than anterior; lamella postvaginalis (postvaginal plate) a V-shaped sclerotized band, its ends not connected to eighth segment's sclerotization; antrum wide, with almost parallel lateral edges, about 2 times as long as wide, dorsoventrally flattened, with large sclerotized antevaginal plate ventrally, otherwise membranous; antevaginal plate occupying almost whole ventral side of antrum, semi-rectangular in shape, slightly narrowing distally, with slightly convex posterior edge; ductus bursae short, slightly longer than wide, about 2 times narrower and 2.5–3 times shorter than the antrum; colliculum as long as wide, its left edge slightly longer than the right one, edges of colliculum not overlapping; bursa copulatrix asymmetrically ovate, membranous, with some

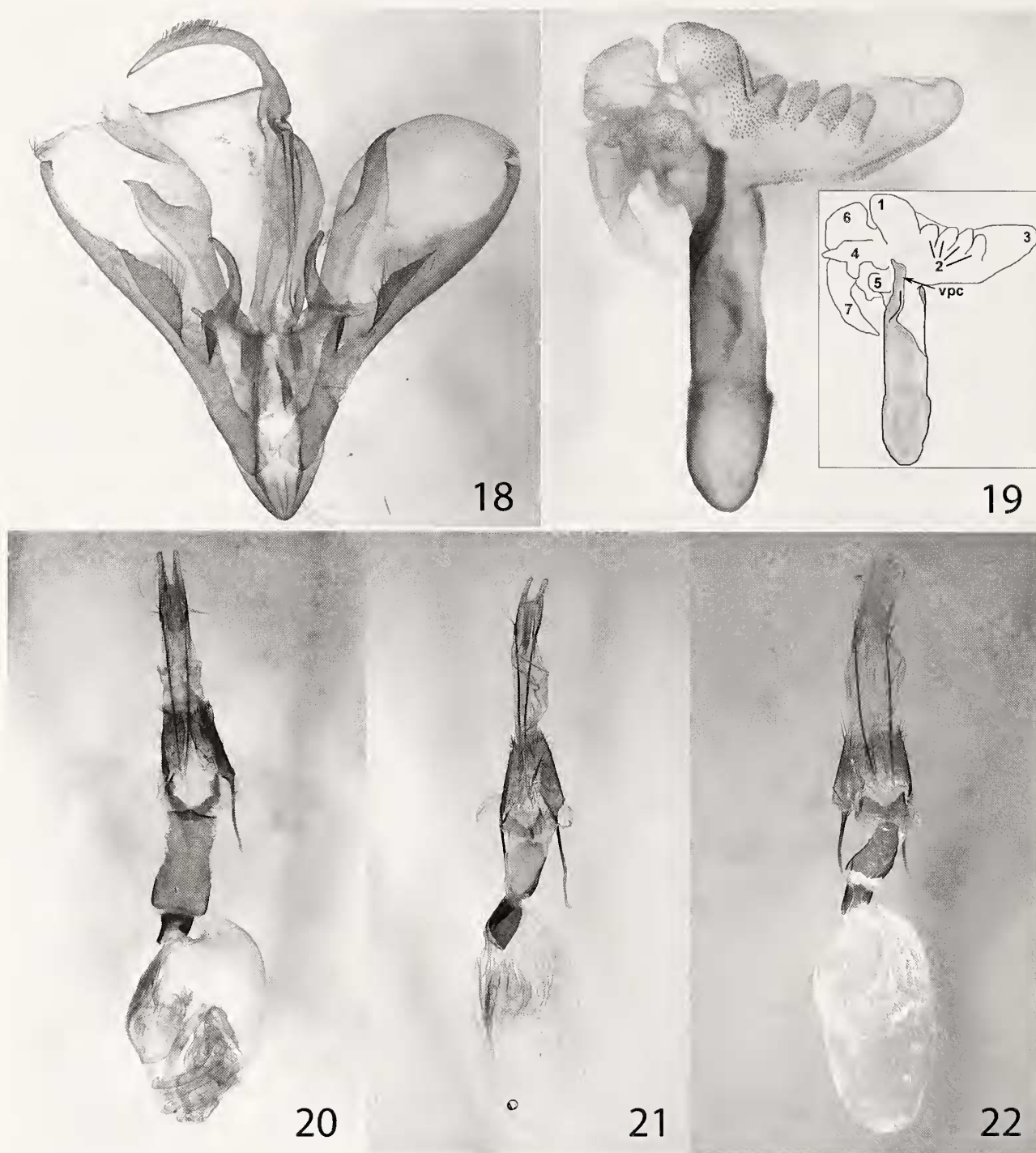


FIG. 18-22. 18. Male genital capsule of *D. walsli* (posterior), holotype. 19. Aedeagus of *D. walsli* with vesica everted (ventral view), holotype. Inset: vpc – ventral plate of carina; 1-7 – numbers of diverticula according to the description. 20. Female genitalia of *D. walsli* (ventral view), paratype, genital prep. by Jan Metlevski No. 945. 21. Female genitalia of *D. divergens* (ventral view), Tuolumne Co., California, genital prep. by Jan Metlevski No. 774. 22. Female genitalia of *D. fumosa* (ventral view), Pima Co., Arizona, genital prep. by Jan Metlevski No. 963.



FIG. 23. Male genital capsule of *D. divergens* (posterior), genital prep. by Jan Metlevski No. 794.

longitudinal wrinkles on left side anterad of insertion of ductus bursae, otherwise smooth; insertion of ductus bursae posteriorly, slightly left; internal wall of bursa copulatrix in posterior half of bursa with very minute spines, most visible at wrinkled area, becoming smaller and barely visible laterad, and disappearing anteriorad; pseudobursa arising posteriorly, right of insertion of ductus bursae, coiling dorsad and to right, making 0.5 coil; ductus seminalis arising from the tip of pseudobursa.

Holotype. ♂, "AZ, Graham Co. Pinaleno Mts. Cunningham Campgrd. 9000 ft. UV + MV lights. 20 May 2002. B. Walsh leg.," "Genitalia Prep. by J. Metlevski No 766", deposited in KSU-MEPAR (Figs. 4–6, 18, 19).

Paratypes. (3 ♂ and 3 ♀): 1 ♂, same label data as holotype, in BW; 1 ♀, "AZ, Graham Co. Pinaleno Mts. Cunningham Campgrd. 9000 ft. Ponderosa pine habitat. 14 June 2005. UV + MV lights. B. Walsh leg.," "Genitalia Prep. by J. Metlevski No 945", in BW (Fig. 20); 1 ♂, "AZ, Graham Co. Pinaleno Mts. Cunningham Campgrd. 9000 ft. Ponderosa pine habitat. 5 June 2007. B. Walsh leg.," in BW; 1 ♀, "AZ, Cochise Co., Chiricahua Mts. Onion Saddle, 7700 ft, Ponderosa Pine/Oak habitat, 14 June 2007. B. Walsh leg.," "Genitalia Prep. by J. Metlevski No 1084", in BW; 1 ♀, "AZ, Cochise Co., Chiricahua Mts. Onion Saddle, 7600 ft, June 14 2007. Leg. Ray B. Nagle", "Genitalia Prep. by J. Metlevski No 1068", in RN (Fig. 7–9); 1 ♂, same label data as above, "Genitalia Prep. by J. Metlevski No 1069", in RN.

Variation. Specimens from the Chiricahua Mountains have the hind wings a slightly brighter ground color and with a stronger dark pattern compared

to specimens from the Pinaleno Mts.

Biology. Unknown. Specimens have been collected in the second half of May and first half of June.

Distribution. Pinaleno Mountains (Mt. Graham) and Chiricahua Mountains in southeastern Arizona.

Etymology. *Drasteria walshi* is named in honor of Bruce Walsh, Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, in recognition of his invaluable efforts in studying the lepidopteran fauna of southeastern Arizona.

Discussion. Female genitalia of *Drasteria walshi* have a greatly enlarged antevaginal plate, which occupies most of the ventral side of the antrum and is longer than the colliculum. This condition of the antevaginal plate links *D. walshi* with *D. fumosa* (Strecker, 1898) and *D. divergens* (Behr, 1870), which are the only other Nearctic species in the genus sharing this character state. In the male genitalia, the aedeagus also provides characters linking *D. walshi* with the two species mentioned above in that the general structure of the vesica, such as the relative position and number of

diverticula, of *D. walshi* is most similar to that of *D. divergens* and *D. fumosa*.

All known specimens of *Drasteria walshi* have been collected in the Pinaleno and Chiricahua Mountains at altitudes between 7500–9000 feet (approximately 2300–2750 m) in ponderosa pine or mixed ponderosa pine/oak forest habitats. Both the Pinaleno Mts. and Chiricahua Mts. are isolated high mountain massifs surrounded by lowland plains grasslands and deserts.

ACKNOWLEDGEMENTS

We thank P. A. Opler and B. C. Kondratieff (Colorado State University), J. H. Boone (Field Museum, Chicago), E. H. Metzler (Alamogordo, New Mexico), and R. B. Nagle (Tucson, Arizona) for loans of specimens used in this study. We are grateful to T. Mustelin (San Diego, California), D. L. Wagner (University of Connecticut) and two anonymous reviewers for reviewing the manuscript. This article is Contribution No. 08-395-J from the Kansas Agricultural Experiment Station (KAES) and was supported in part by KAES Hatch Project No. 583 (Insect Systematics).

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Received for publication 1 July 2008; revised and accepted 9 December 2008